Gender difference in prevalence of signs and symptoms of temporomandibular joint disorders: a retrospective study on 243 consecutive patients

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Abstract: BACKGROUND: This study evaluated the prevalence of the signs and symptoms of temporomandibular joint disorder (TMD) among patients with TMD symptoms. METHODS: Between September 2011 and December 2011, 243 consecutive patients (171 females, 72 males, mean age 41 years) who were referred to the Department of Prosthodontics, Faculty of Dentistry, Karadeniz Technical University, Trabzon were examined physically and completed a questionnaire regarding age, gender, social status, general health, antidepressant drug usage, dental status, limited mouth opening, temporomandibular joint (TMJ) sounds, and parafunctions (bruxism, clenching). The data were analyzed using the chi-square test and binary logistic regression model (alpha = 0.05). RESULTS: With a frequency of 92%, pain in the temporal muscle was the most common symptom, followed by pain during mouth opening (89%) in both genders. TMJ pain at rest, pain in the masseter muscle, clicking, grinding, and anti-depressant use were significantly more frequent in females than males. Age (p=0.006; odds ratio 0.954; 95% CI 0.922-0.987) and missing teeth (p=0.003; odds ratio 3.753; 95% CI 1.589-8.863) had significant effects on the prevalence of TMD. CONCLUSION: Females had TMD signs and symptoms more frequently than males in the study population. The most common problem in both genders was pain.

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Gender Difference in Prevalence of Signs and Symptoms of Temporomandibular Joint Disorders: A Retrospective Study on 243 Consecutive Patients

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Abstract

Bacground: This study evaluated the prevalence of signs and symptoms of temporomandibular joint disorder (TMD) among the patients with the complaint of TMD symptoms. **Methods:** Between September 2011 and December 2011, 243 patients (171 female, 72 male, mean age: 41 years old) consecutive patients who referred to the Department of Prosthodontics, Faculty of Dentistry, Karadeniz Technical University, Trabzon were examined by inspection, palpation and also questioned using a questionnaire regarding to age, gender, social status, general health disease, antidepressant drug usage, dental status, limited mouth opening, temporomandibular joint (TMJ) sound and parafunctions (bruxism, clenching). Data were analyzed using chi-square test and binary logistic regression model (alpha: 0.05). **Results:** Pain in temporal muscle with a frequency of 92% was the most common symptom followed by pain during mouth opening (89%) in both genders. TMJ pain at rest, pain in masseter muscle, clicking, grinding, anti-depressant use were significantly more frequent in the females than males. Age (p=0.006; odds ratio: 0.954; 95% CI; 0.922-0.987) and missing teeth (p=0.003) (odds ratio: 3.753; 95% CI; 1.589-8.863) showed a significant effect on the prevalence of TMD. **Conclusion:** Females exhibited more frequently TMD signs and symptoms compared to males in the studied population. The most common problem was pain in both genders.

Key words: temporomandibular joint dysfunction, orofacial pain, epidemiology, oral parafunctions, dental health.

Introduction

It is generally accepted that the aetiology of temporomandibular joint disorders (TMD) is multifactorial, relating to a number of dental and medical conditions such as occlusion, posture, parafunctional habits, restorative procedures, orthodontic treatment, emotional stress, trauma, anatomy of the disc, pathophysiology of the muscles, genetic and psycho-social conditions, age and gender [1,2]. Typical signs and symptoms of TMD are pain, limited mouth opening, joint sounds, mandibular deviation and chewing disability. These symptoms may either exist alone or in combination with several other symptoms [2].

Pain is the most important symptom of TMD for both the patients and clinicians as it is often the main reason why patients seek for medical help [3]. Most patients suffer from pain during mandibular movements or at rest, or on palpation of the muscles. Pain occurs due to the alterations in muscle activity that limits the movements of the mandible and protects it from further damage while trying to promote healing [4]. TMD could also occur as a consequence of pain of non-dental origin in the orofacial region including head, face and related structures [4]. TMD have been found responsible from possible causes of headaches as positive correlation was found between TMD and the prevalence of headaches [4]. Fortunately, treatment of symptomatic TMD significantly decreases headache complaints [5,6]. Although limited mouth opening is generally a result of painful mandibular movement, it may or may not be accompanied with pain. In general, less than 30 mm mouth opening is considered as limited mouth opening [7].

TMJ sounds, such as clicking or crepitating, were one of the most commonly reported symptom followed by headache [8]. Since sound is not always considered as a problem but rather as a risk factor, TMJ click may be a normal variant rather than a disorder [9]. Changes in condyle morphology, disk displacement, and mechanical disk derangements may cause TMJ click without pain or significant dysfunction. Epidemiologic studies have shown an increased prevalence of TMJ sounds among the patients aged between 15 and 25 years old [10].

Alterations in occlusion such as Angle malocclusions, crossbite, open bite, occlusal interferences, excessive overjet and overbite, crowding, midline discrepancies and missing teeth have been identified in different studies as predisposing, triggering or perpetuating factors for TMD [11]. Lateral bite forces between the retruded contact position and the intercuspal contact position as well as unilateral crossbite are considered as possible local risk factors for development of TMD [10]. Parafunctional habits such as bruxism, tooth clenching, gum chewing, biting foreign objects and prolonged nail biting possibly increase the risk of development of TMD [10,11]. Parafunctional activities are usually harmless, until the exerted forces exceed the structural tolerance [7]. It has been reported that bruxism and clenching determines joint space reduction, followed by disc compression and as a result pain occurs in masticatory muscles [9]. Also, psychological factors have been closely linked to TMD and may be a component of the clinical presentation. Increased levels of somatisation, depression or anxiety, affect TMD sufferers negatively compared to people without TMD [12].

Epidemiology is a discipline that evaluates the frequency and distribution of conditions related to the disease or health in a population. The importance of the epidemiological studies with regard to TMD concerns the knowledge of several symptomatic complexes and the therapeutic approaches that would eventually help to establish prevention and control programs [3]. The aim of this study therefore was to evaluate the prevalence of signs and symptoms in TMD patients and to investigate whether its prevalence is influenced by gender.

Methods

Subjects

Data of the present study were collected from 243 consecutive patients (171 female, 72 male, 14 and 59

years of age, mean age: 41 years) seeking treatment for TMD at the Karadeniz Technical University, Faculty of Dentistry, Department of Prosthodontics, Trabzon. Patients who joined the study read the informed consent form and their approval were registered. The Ethical Committee in Human Research of Karadeniz Technical University approved the protocol of this research (Number: 2011.91.21.2).

Patients with fibromyalgia, trigeminal neuralgia, burning mouth syndrome, atypical facial pain, migraine, atypical odontalgia, cervical, neuropathic pain and those with a history of previous TMD treatment were excluded from the study.

Patients were initially questioned using a questionnaire created according to the Research Diagnostic Criteria for TMD (RDC/TMD) [11] considering the following items: age, gender, social status, general health disease (diabetes mellitus, osteoporosis, arthritis, etc.), antidepressant drug use, dental status (missing/filled teeth, fixed/removable prosthetic restorations), occlusion type, limited mouth opening, TMJ sound and parafunctions (bruxism, clenching).

Clinical examination

Anamnesis was taken from the patients, their complaints were listened, clinical observations were made, and muscles and TMJ were examined. Physical examination was performed by inspection, palpation and intraoral examination in the order of the items in the questionnaire. Masticatory muscle, subhyoid and suprahyoid muscle and head-neck muscle examinations were made with palpation. Tense areas and pain localizations were identified. Masseter was palpated at its attachments to the zygomatic arch and angle of the mandible. The temporalis both in the temporal fossa and intraorally along the ascending ramus of the mandible, and the medial pterygoid were examined bimanually, placing one finger externally at the medial aspect of the angle of the mandible and the other finger intraorally in the lingual vestibule in the retromolar region. While lateral pterygoid muscle was palpated behind tuber maxilla towards medial, digastric muscle was palpated in the mid-point of the distance between angulus mandibula and the jaw. Mouth opening was measured between

central incisors using a ruler. TMJ sounds were evaluated with a stereoscope and recorded as no sound, click or crepitation.

One calibrated examiner examined all subjects and a second reviewer controlled whether all questions were correctly understood and fully answered.

Statistical analysis

Data were analyzed using a statistical software package SPSS for Windows 15.0 (SPSS Inc., Chicago, IL). Chi-square test was used to compare the distribution of variables in TMD patients depending on the genders and binary logistic regression model tests were used to find out dominant factors. *P* values less than 0.05 were considered statistically significant for all statistical tests. The confidence level was set at 95%.

RESULTS

In the studied population, females were more in number (n=171) corresponding to 70% of the study group (mean age: 35 years) than those of males (n=72; 30%) with a mean age of 41 years.

Class I malocclusion (…% females, …% males) was more common followed by Class II (…% females, …% males) and Class III (…% females, …% males).

Pain in temporal muscle with a frequency of 92% was the most common symptom followed by pain during mouth opening (89%) in both genders. TMJ pain at rest and pain in masseter muscle, were significantly more frequent in the females than males (Table 1). Among TMJ sounds and parafunctions, clicking (p=0.044) and grinding (p=0.013) were significantly more frequent in females than in males (Table 2).

Antidepressant drug use was reported by 16% of the patients and females reported significantly more usage than males (p=0.021). Limited mouth opening was observed in 89% of the patients but it was not

significantly different between the genders (p=0.219). Hyperactivity in temporal muscle was less frequent (8%) (p>0.05) (Table 3).

No significant difference was found between the groups dental status according to gender (p>0.05) (Table 4).

Age (p=0.006; odds ratio: 0.954; 95% CI; 0.922-0.987) and missing teeth (p=0.003) (odds ratio: 3.753; 95% CI; 1.589-8.863) showed a significant effect on the prevalence of TMD (Table 5).

Discussion

A number of factors such as dental status, number of teeth, parafunctions, clicking and locking of the jaws and a history of trauma have been studied in relation to TMD [2]. Characterization of TMD has been difficult due to the large number of symptoms and signs, and the variation in the number and types manifested in any particular patient. Systematic review of clinical studies reported that age, gender and psychological factors were associated with TMD. Several retrospective clinical studies investigated the relationship between the risk factors and TMD. Michelotti et al. examined the effect of oral parafunctions on TMD in 557 patients with the conclusion that…… [13]. In the study of Lee et al. on 87 patients psychological distress was found to have an affect …….. [14]. In another study, malocclusion and orthodontic treatment was (not) associated with TMD [15] and in the study of Hagag et al. studied the occlusion, prosthodontic treatment seemed to have (not) influenced TMD [16].

In this study, primarily the gender effect on the prevalence of signs and symptoms of TMD was studied. Epidemiological studies generally document a greater frequency and severity of TMD in females than in males [11,17]. Although these differences have been explained by behavioural, psychosocial, hormonal and

constitutional factors, no conclusive results have been drawn to date [11,15]. In the present study, females were found to have a higher risk of TMD (2.3:1) than males. Yet, the results were not significant. Similar observations were made in the study of Manfredini et al. on 433 patients where the risk ratio was 2.6:1 (276 females, 73.2%; 101 males, 26.8%) [17].

Patients with TMD generally suffer from different kinds of pain. This study also demonstrated that there is a strong relationship between TMD and orofacial pain. TMD related orofacial pain is generally seen as a chronic and regional pain in the form of headache or earache. In our questionnaire form, pain was localized during opening mouth, mastication or at rest, headache, and earache, pain in temporal muscle or in masseter muscle. The patients mostly reported pain in the temporal region (92%), followed by headache (87%). Cooper et al. examined the presence of symptoms and signs of TMD on 4528 patients and reported that 96.1% of the patients complained about TMJ pain, following headache (79.3%) [2]. Although the study population was smaller than that of Cooper et al. [2], similar trends were observed.

The incidence of TMD pain in females has been widely studied [3]. While Velly et al. reported that females had approximately three times the risk of myofacial pain in comparison to males on 83 patients [18], Karibe et al. investigated 71 patients and found that chewing significantly increased pain in patients with a history of chronic masticator muscle pain but also in females with no such history [19]. Moreover, the increased pain persisted significantly longer in female patients. According to the results of the present study, pain in joint region at rest position and in masseter muscle was significantly greater in females than males. This significance may be related to the biological, anatomic or hormonal factors acting alone or in combination for females.

TMJ sounds, in the form of click, crepitus, are other signs and symptoms for TMD patients [8,20]. The results of this study indicated that joint sound was not a frequent symptom. The patients in this study

suffering from TMD presented 39% clicking and 6% crepitus. In another similar study, on 40 patients 40% clicking and 15% crepitus were observed [21]. Although in this study, no significant difference was found between the genders regarding to these signs, Troeltzsch et al. on 1031 patients reported significant difference for TMJ click in females compared to males [22]. In the current study, significant difference was found between genders in terms of click sound and this was nearly four times more frequent in females than in males.

A reduction in the mouth opening frequently resulted from painful jaw movements that cause problems during chewing and social difficulties for the patients. Clinically, limited mouth opening poses problems for dental treatments. In general, mouth opening is greater in males than in females [23,24]. This difference may be the result of the variations in mandibular length between males and females that shows also significant variations between genders [21]. The results of this study also indicate that the patients with limited mouth opening are mostly females when compared with males. Limitations in the mouth opening were more frequent in females (61%) than in males (28%) that may affect dental treatments.

Parafunctional habits such as bruxism, clenching only, grinding only and clenching combined with grinding are considered among the important etiological reasons for TMD [18,25]. In bruxist patients, the habit of pressing or grinding the teeth produces changes in the lubrication mechanism of the articular structures due to the overload on the articular surfaces, leading to alterations in the TMJ biomechanics [26]. In this study, the most frequent parafuctional habit was clenching the teeth, with a frequency of 54%, following grinding with a ratio of 19%. Psychological factors have been possibly closely linked to these findings. Usually TMD patients show increased somatization, stress, depression and anxiety [27,28]. Sixteen percent of the patients in the current study declared that they have been using an antidepressant drug, with the females slightly higher yet significant than those of males. However, the main reason for the use of such antidepressant drugs could not be identified with the questionnaire used. Further studies should also investigate whether

drug use is to avoid TMD symptoms or not. Nevertheless, the prevalence of TMD sounds and parafunctions tended to increase with the increased stress level, especially in female patients [28].

Dental status, malocclusions, missing teeth has been identified in different studies as predisposing factors for TMD [29,30]. However, studies present controversial information on this aspect where occlusion related factors were also found weakly associated to TMD [10]. Regression analysis indicated significant influence of missing tooth on the incidence of TMD. The results need to be verified in a larger population also considering the number of missing teeth.

TMD with multi factorial etiologies contain different kinds of risk factors where age, gender, social status or race is believed to be associated with TMD. Although the results of epidemiologic studies generally confirm one another's findings, contradictory results may be obtained. One reason for this situation could be attributed to non-standardized examination procedures [10]. Different evaluation methods such as questionnaires, clinical examinations and the number of studies are still insufficient to understand the real mechanism of TMD. Each clinician who is confronted with a patient who has a complaint about TMD needs to recognize and address the whole problem to maximize the potential for a successful outcome. The results of this study in general indicate the higher tendencies for females to suffer from TMD. In addition, age related factors and missing teeth needs further attention in evaluating TMD patients. Healthcare systems may implement this information to their policies.

Conclusions

Females exhibited more frequently TMD signs and symptoms compared to males in the studied population. The most common problem was pain in both genders. The incidence of headache, earache, pain in temporal muscle, limited mouth opening were the most frequent symptoms being more than 80% in TMD patients. Age and missing teeth showed a significant effect on the prevalence of TMD.

Competing Interests

The authors have declared that no competing interest exists.

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Legends to tables

Tables

Table 1. Incidence of TMD symptoms and significant differences between genders. *Significance at $p<0.05$.

Table 2. Incidence of TMJ sounds, parafunctions and significant differences between genders. *Significance at $p<0.05$.

Table 3. Incidence of other TMD symptoms, antidepressant drug use and significant differences between genders. *Significance at $p<0.05$.

Table 4. Dental status and significant differences between genders. *Significance at $p<0.05$.

Table 5. List of variables and their significant effect on the TMD according to binary logistic regression model tests. *Significance at $p<0.05$.

Tables

Symptom	Female	Male	Significance	Incidence (%)
Pain during opening mouth	120	55	p=0.352	72
Pain during mastication	112	50	p=0.655	66
Headache	149	63	p=0.1	87
Earache	147	65	p=0.407	87
TMJ pain at rest	129	44	p=0.018*	71
Pain in masseter muscle	113	34	p=0.009*	39
Pain in temporal muscle	158	67	p=0.858	92

Table 1. Incidence of TMD symptoms and significant differences between genders. *Significance at p<0.05.

Symptom	Female	Male	Significance	Incidence (%)
Clicking	74	21	p=0.044*	39
Crepitation	8	8	p=0.087	6
Clenching	96	37	p=0.573	54
Grinding	40	7	p=0.013*	19

Table 2. Incidence of TMJ sounds, parafunctions and significant differences between genders. *Significance at p<0.05.

Symptom	Female	Male	Significance	Incidence (%)
Hyperactivity in temporal muscle	12	8	p=0.311	8
Limited mouth opening	150	67	p=0.219	89
Antidepressant drug use	21	18	p=0.021*	16

Table 3. Incidence of other TMD symptoms, antidepressant drug use and significant differences between genders. *Significance at p<0.05.

Dental status	Female	Male	Significance	Incidence (%)
Missing teeth	95	37	p=0.575	54
Unerupted teeth	37	14	p=0.863	20
Teeth with fillings	83	18	p=0.713	37
Fixed partial denture	34	17	p=0.605	20
Removable partial denture	13	5	p=0.858	7
Complete denture	5	5	p=0.150	4

Table 4. Dental status and significant differences between genders. *Significance at p<0.05.

		B	S.E.	Wald	df	Significance	Exp (B)	95% CI.	
								Lower	Upper
Variables	Age	-,047	,017	7.554	1	,006*	,954	,922	,987
	Wisdom tooth	-19.553	14373.941	,000	1	,999	,000	,000	
	Missing tooth	1.322	,438	9.096	1	,003*	3.753	1.589	8.863
	Filling	-21.223	4814.836	,000	1	,996	,000	,000	
	Fixed partial denture	2.233	16747.565	,000	1	1.000	9.332	,000	
	Removable partial denture	-22.068	14094.323	,000	1	,999	,000	,000	
	Complete denture	20.982	14094.323	,000	1	,999	1295147073.969	,000	
	Drug use	38.155	9851.574	,000	1	,997	3720694 9702489 390.000	,000	
	Constant	2.693	1.167	5.323	1	,021	14.776		

Table 5. List of variables and their significant effect on the TMD according to binary logistic regression model tests. *Significance at p<0.05.